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CLAMPING AND/OR BRAKING DEVICE

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The invention concerns a clamping and/or braking device with the features of the preamble of Patent Claim 1.

Clamping or braking devices are known in the most varied embodiments for the most varied application cases. Thus, a braking device of a linear guide is known in EP-A-0 936 366 that has a supporting body and can be moved along a guide track. The supporting body has brake shoes, which act on the two longitudinal sides. The supporting body is shaped like an H and has a thin, elastically flexible crosslink and two lower legs, with which it grips the guide track. A brake shoe is located between a lower leg and the guide track. The supporting body is provided with two upper legs, which, together, form a holding space with the crosslink, in which a force-producing means, acting on the upper leg, is provided. This can be hydraulically or pneumatically actuatable toggle lever mechanics or a piezoelectric actuator. Moreover, a hydraulically or pneumatically actuatable wedge valve can be provided as a force transducer, which is conducted in a formed space, which tapers in the longitudinal direction of the brake device, between the upper legs of the supporting body. In all cases, a bending of the elastic crosslink takes place due to the force pressurization of the two upper legs, so that the two lower legs are moved inwards with the brake shoes or apply pressure on the guide track with a large force.

The disadvantage with this known brake device, in connection with the use of an electromechanical transducer such as a piezoelectric element, is, in particular, its sensitivity with respect to vibrations or other mechanical loads.

The use of a toggle lever or a wedge valve, just like an electromechanical transducer, means a high installation or production expense.

In addition, there is, in particular with clamping devices, the requirement of sufficiently high clamping forces, which, with known devices, can be implemented only with a relatively high construction and thus financial expense.

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1 From US 5,855,446, a hydraulic clamping bushing is known, which is aligned on a shaft
2 and can be connected to it, for example, in a stationary manner. The bushing essentially has a
3 stable bushing body, which is located at a distance around a drive shaft. Adjacent to these
4 bushing bodies and facing the shaft, a chamber which can be acted on with pressure is provided.
5 A side wall of this chamber, which extends essentially parallel to the shaft is used here, at the
6 same time, as a braking element, which with the action of pressure on the chamber is pressed
7 against the shaft by the expansion of the chamber, in order to produce a friction-locking
8 connection. A Σ -shaped formation of the laterally adjacent walls of the chamber is meant to
9 prevent the bushing from aligning crooked with respect to the wall when the pressure acts on
10 chamber. The Σ -shaped side walls of the chamber make possible, in the case of pressure
11 pressurization, an expansion of these side walls in a radial direction toward the shaft, before the
12 increasing chamber pressure also presses the chamber wall, running parallel to the shaft, against
13 the shaft. Thus, the bushing can be aligned at right angles to the shaft axis, before the torsional
14 connection is produced.

15 This clamping device does not have a favorable power transmission for the creation of a
16 higher pressing force. Furthermore, in its shape and in particular, in its placement possibility
17 relative to the bushing body, the chamber is limited. The braking effect can be attained here only
18 by acting on the chamber with excess pressure, and the actual braking element, which must
19 perhaps transfer high driving forces, is not firmly connected to the bushing body, but rather only
20 via the inevitably relatively unstable pressure chamber.

21 From WO 01/34990 A1 from the applicant, a clamping and/or braking device is known,
22 in which a chamber which can be acted on with pressure is provided on a basic body; in at least
23 one partial area of at least one deformable or tension-resistant and/or pressure-resistant wall, the
24 chamber is limited. The limitation of the chamber opposite the wall can also be constructed like
25 the first wall. However, it can also be a rigid part of a body. Preferably, the walls lie at a
26 relatively small distance from one another. The forces resulting from the deformation of the
27 chamber are conducted, at least in part, in the direction of or along the wall and in the area of the

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1 connection of the wall to a basic body are introduced into the latter. If one selects the point of
2 attack of such forces on the basic body, and if this basic body is, at least partially, elastically
3 deformable, then the forces can be transferred, for example, into the clamping or braking areas
4 via this basic body on other sites of the basic body. A corresponding braking or clamping means
5 in these areas can then be moved, by means of the forces, into a pressurizing position or out of it,
6 so as to brake or release a guide element or an element which has to be clamped or braked. Both
7 applied excess or reduced pressure in the chamber can be used thereby, in order to introduce
8 both tractive and compressive forces to the basic body. Of course, before and after the
9 introduction of force, the clamping and/or braking areas are still engaged with the guide element
10 or the element to be clamped or braked, wherein, however, changes in the pressurizing forces
11 between the clamping and/or braking areas and the other element result.

12 This known clamping and/or braking device is based on the knowledge that when acted
13 on by a reduced or excess pressure, a suitable chamber tends to a deformation. If this chamber,
14 to a great extent, is formed by at least one approximately plane wall, then the excess or reduced
15 pressure in the chamber first causes a deformation in a first direction running essentially
16 perpendicular to this wall. In order to yield to the deformation (expansion or contraction) in this
17 first direction, the result from this, in a correspondingly reverse manner, is a contraction or
18 expansion of the chamber in a second direction generally running perpendicular to the first
19 direction (that is, essentially parallel to the wall). The fact is used thereby that low forces or
20 deformations in the first direction produce large forces in the second direction, which can be
21 used to brake or clamp or to release pretensioned clamping or braking devices.

22 On the basis of this state of the art, the goal of the invention is to create a clamping
23 and/or braking device, which can be produced with lower construction expense and with which
24 sufficiently high braking or clamping forces can be produced in a simple manner.

25 The invention attains this goal with the features of Patent Claim 1.

26 The invention is based on the knowledge that by means of at least one plate-like element,
27 which is located in a housing and has a convex bending area, a clamping and/or braking device

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1 can be produced at low cost; this device can also produce very high clamping and/or braking
2 forces by means of an only gaseous pressure medium--that is, pneumatically. However, it is clear
3 that a hydraulic actuation of the device is also possible. The function of the device is guaranteed
4 by the convex formation of at least one bending area of the plate-like element, with application
5 on its convex side of an excess pressure from a pressure medium, wherein a corresponding
6 pressure space is provided on the side of the bending area, which curves convexly outwards.
7 With pressure acting on the bending area, its curvature is reduced, so that the expansion of the
8 plate-like element between two ends is increased, of which one is supported on the housing and
9 the other acts, directly or indirectly, via a pressurizable element, on the object to be clamped or
10 braked. The plate-like element is thereby so pressure-resistant and constructed so elastically
11 deformable in the at least one bending area that between the two ends, an elastic element is
12 formed. The pressure resistance of the plate-like element must be designed in such a way that
13 when a predetermined, maximum permissible force is exerted on the second end (pressurizing
14 end), a sharp bending does not occur.

15 Of course, a corresponding free space, which makes possible a sufficient bending of the
16 bending area, must be present on the concave side of the bending area, turned away from the
17 pressure application side. This free space can be connected to the surroundings--that is, to the air
18 pressure of the surroundings. However, it can also be closed airtight so that the bending of the
19 bending area must take place, against an increasing pressure, in the free space.

20 Contrary to the known device of the applicant, it is possible, with these embodiments, to
21 produce or to change clamping and/or braking forces, without hereby having to deform an
22 essentially rigid body. In this way, aside from a simple construction, a small model results. The
23 device is, moreover, simple to produce, since only the plate-like element must be placed in the
24 housing.

25 Contrary to the known clamping bushings, which have relatively soft walls, and which
26 increase the distance between a pressurizable element and a base element when acted on with
27 excess pressure, it is also possible with the device in accordance with the invention to produce a

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1 predetermined clamping and/or braking force, with which the object to be clamped or braked is
2 acted on, even in a pressure-less state during a corresponding pretensioned installation of the
3 device in the complete device. In this way, for example, a control of the device is possible, in
4 such a way that a change between a braked (in the pressure-less state) movement of the
5 pressurized object and a complete clamping of the object (with a sufficient pressurization)
6 results.

7 The more frequent use of the device in accordance with the invention, however, is the
8 one where in the pressure-less starting state, the object is not acted on and with a pressurization
9 of the device, is braked or clamped.

10 With a linearly functioning clamping and/or braking device, the at least one plate-like
11 element can have a, for example, rectangular shape, wherein the entire element can be convexly
12 curved between two edges. The first and the second ends are then formed by those edges or end
13 areas between which the curvature runs. At least in the area of the bending (if the entire
14 plate-shaped element is not bent), the side edges must be essentially sealed off with respect to
15 the housing (a small leakage can be tolerated, under certain circumstances, if, for example,
16 compressed air is used as the pressure medium and the required pressure can be attained and
17 maintained in spite of the leakage)

18 According to one development of the invention, a pressurizable element is provided,
19 which is constructed in one piece with the housing and as a part of the housing, or which is
20 constructed as a part connected to the housing in a detachable manner, wherein the pressurizable
21 element is constructed deformably in such a way that with a pressure application of the pressure
22 space, a movement of at least one section of the pressurizable element takes place in the
23 direction of the object or the transferable clamping and/or braking forces, produced by the at
24 least one plate-like element, are transferred to the object. With such a deformable pressurizable
25 element, the pressure space can be sealed off in a simple manner, with respect to the at least one
26 plate-like element--namely on the pressurizing edge or the second end of the plate-like element,
27 with respect to the pressurizable element. Basically, however, a pressurizable element is not

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1 connected to the housing can also be used, which, for example, can be constructed
2 correspondingly large for the distribution of the pressing force on a greater surface. Moreover,
3 the pressurizable element can be used to adapt the pressing surface (constructed then on the
4 pressurizable element) to the shape of the object.

5 In a development of the invention, the first end of the at least one plate-like element can
6 be connected to the housing, especially if in the realization of a linearly acting clamping and/or
7 braking device, a pressurizable element not connected to the housing is used or the object is
8 acted on directly by the second end of the at least one plate-like element.

9 In the preferred embodiment of the invention, the first end of the at least one plate-like
10 part, however, is supported, without a firm connection, against the housing. With the presence of
11 a pressurizable element, the second end of the at least one plate-like part is also preferably
12 supported, without a firm connection, against the pressurizable element. In this way, a simple
13 installation of the device results.

14 According to one embodiment of the invention, the at least one-plate-shaped element is
15 annular, preferably, circular, so as to create a device that makes possible the clamping of bar- or
16 rod-shaped objects, in particular, in the cross section of circular-cylindrical objects.

17 The ring-shaped, plate-like element can be shaped convexly, in the starting state, via
18 essentially the entire radial cross section, wherein essentially the entire ring-shaped wall of the
19 ring-shaped, plate-like element serves as the bending area. Such a plate-like element can be
20 produced very simply and at low cost and can be used also for a large number of variants.

21 The at least one ring-shaped, plate-like element preferably has radial slits that are open
22 inwardly or outwardly, wherein, preferably, the second end--that is, the pressurizing end of the
23 ring-shaped, plate-like element--is formed by the inside or outside end of the ring-shaped,
24 plate-like element. The slits preferably extend to just before the opposite end of the ring and are
25 present in such a number that proceeding from the closed ring area, individual sections extend
26 inwardly or outwardly. These sections reduce the required deformation of the ring in the azimuth
27 direction, if the curvature of the convex bending area is reduced during pressurization.

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1 With such slit, ring-shaped, plate-like elements, it is possible to provide one or more
2 sealing elements, preferably, in the shape of a deformable layer, on a part or on the entire surface
3 of the plate-like element, on the inside and/or outside surfaces of the plate-like elements, relative
4 to the pressure space, at least in the area of the slits. In this way, a common pressure space can
5 be used for the individual sections between the slits. The sealing of the slits can, for example,
6 take place by vulcanizing on a relatively hard, but nevertheless, sufficiently deformable rubber
7 layer. Such a layer can be produced even on the side of the ring-shaped, plate-like element,
8 turned away from the pressurization, without the danger of loosening the layer during a
9 pressurization.

10 In the preferred embodiment of the invention, the bending of the at least one bending
11 area of the at least one plate-like element is limited in such a way that after the discontinuation
12 of the pressurizing of the pressure space with excess pressure as a result of the elastic effect of
13 the at least one bending area, it returns to the starting state. One designates, as the starting state,
14 the pressure-less state, wherein in this state also, depending on the dimensioning or installation
15 of the clamping and/or braking device, the at least one bending area can be pretensioned. A
16 corresponding stop for the bending area can be formed, for example, by an inside housing wall.

17 According to one development of the invention, several plate-like elements, arranged
18 essentially parallel to one another, can be provided, whose second ends have a predetermined
19 distance to one another, in order to transfer clamping and/or braking forces to the object, via a
20 prespecified expanded area, wherein for each plate-like element, a separate pressure space or for
21 several or all plate-like elements, a common pressure space can be formed.

22 When using several plate-like elements, at least one pair of plate-like elements can be
23 provided, whose first and second ends are directly adjacent or at a close distance to one another,
24 and whose convex bending areas run convexly outwards, relative to the other plate-like element
25 of the pair of plate-like elements, wherein a common pressure space is provided for the
26 pressurization of the bending areas of the two plate-like elements of a pair. This variant offers
27 the advantage that the two plate-like elements are pressed against one another during a

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1 pressurization and so the space required between the two elements can be sealed off with lower
2 pressure in a simple manner. For example, the rubber coating mentioned in the preceding can be
3 provided inside or can be a sealing element connected to the inside surfaces of the plate-like
4 elements.

5 In addition, the plate-like elements of a pair can be designed in such a way that they lie
6 close to one another, with at least one partial area of the sides facing one another in an ending
7 state when acted on with an excess pressure greater or equal to a prespecified maximum
8 pressure, wherein the ending state is defined by a suitable formation of the bending areas in such
9 a way that from the ending state, an automatic return to the pressure-less starting state takes
10 place. In this way, a plate-like element is used as a stop for the at least one bending area of the
11 other plate-like element.

12 According to one embodiment of the invention, a pressurizable element can be provided,
13 which is constructed rigid in the entire area in which the several plate-like elements are active. In
14 this way, a more uniform transfer of the clamping and/or braking forces can be attained on the
15 object.

16 With all embodiments of the invention, the creation of the clamping and/or braking
17 forces, however, takes place exclusively or at least, for the most part, predominantly due to one
18 pressurization and the bending hereby produced and thus the change of the effective expansion
19 of the plate-like elements between the two ends. This is also true for the case that one surface of
20 the pressurizable element is acted on completely or partially with pressure, if the bending area(s)
21 of the plate-like elements are acted on with pressure. The forces hereby produced, which are
22 comparable with the forces arising with common clamping bushings, can be practically
23 neglected however.

24 In another embodiment of the invention, the housing and the pressurizable element can
25 be designed as essentially H-shaped bodies, wherein the at least one plate-like element and the
26 pressure space are provided between the essentially parallel, upper legs of the H-shaped body,
27 wherein clamping and/or braking areas are provided on the essentially parallel, lower legs of the

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1 H-shaped body for the transfer of the clamping and/or braking forces to the object and wherein
2 the H-shaped body is elastically deformable in the area of the middle crosslink and/or the
3 connecting areas of the middle crosslink with the legs of the H.

4 In a similar manner, the housing and the pressurizable element can be designed as
5 essentially U-shaped bodies, wherein the at least one plate-like element and the pressure space
6 are provided between the essentially parallel legs of the U-shaped body, wherein clamping
7 and/or braking areas are provided on the essentially parallel legs of the H-shaped body for the
8 transfer of the clamping and/or braking forces on the object and wherein the U-shaped body is
9 elastically deformable in the area of the base of the U and/or in the area of the legs of the U.

10 Other embodiments of the invention can be deduced from the subclaims.

11 The invention is explained in more detail below, with the aid of the embodiment
12 examples shown in the drawing. The figures in the drawing show the following:

13 Figure 1, a longitudinal section (Figure 1a) and a detail enlargement (Figure 1b) of a first
14 embodiment of a clamping and/or braking device, according to the invention, for the
15 pressurizing of a circular-cylindrical object, using a ring-shaped, plate-like element;

16 Figure 2, a top view of the ring-shaped, plate-like element in Figure 1 and a detail
17 enlargement in sectional view along the line A-A (Figure 2b);

18 Figure 3, a longitudinal section (Figure 3a) and a detail enlargement (Figure 3b) of a
19 second embodiment of a clamping and/or braking device according to the invention for the
20 pressurization of a circular-cylindrical object, using several pairs of ring-shaped, plate-like
21 elements;

22 Figure 4, a detail enlargement of a third embodiment of a clamping and/or braking device
23 according to the invention, analogous Figure 3, but using a ring-shaped pressurizable element;

24 Figure 5, a detail enlargement of a fourth embodiment of a clamping and/or braking
25 device according to the invention, analogous Figure 4, but using a pressurizable element,
26 constructed as one piece with the housing; and

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1 Figure 6, a schematic cross section through a fifth embodiment of a clamping and/or
2 braking device according to the invention for the realization of a linear guide.

3 The embodiment of a clamping and/or braking device 1, shown in Figure 1 in a
4 schematic longitudinal section, has a ring-shaped housing 3, which consists of a first part 5 with
5 a ring-shaped recess 7 and a second part 9, which is connected to the first part 5, for example,
6 screwed to it. In the recess 7, between the first and second housing part 5, 9, a ring-shaped,
7 plate-like element 11 is located. The ring-shaped, plate-like element 11 is shaped slightly convex
8 in the radial section and applies pressure on the circumferential wall of the ring-shaped recess 7
9 of the first housing part 5 with its outside end or its outside boundary 11a.

10 As can be seen from Figure 1b, the ring-shaped, plate-like element 11, consisting, for
11 example, of a steel sheet, can be connected, on one side, to a sealing element 13, for example, a
12 relatively hard, but still sufficiently deformable rubber ring. The ring-shaped, plate-like element
13 11 is, as shown in Figures 2a and 2b, provided with a large number of slits 14, which proceeding
14 from an outside boundary area 11c, which is also closed in the shape of a ring, run radially
15 inwards and open toward the inside.

16 The ring-shaped, plate-like element 11 defines, together with the sealing element 13, on
17 its convex side, together with the inside wall of the first housing part 7, a pressure space 15, to
18 which a pressure medium can be supplied, for example, compressed air. Of course, however, a
19 liquid pressure medium can also be used. The pressure space 15 is constructed open toward the
20 inside in the embodiment shown in Figure 1 and must be sealed off, with respect to the object 17
21 to be acted on, for example, a rotatable shaft. This can take place by means of corresponding
22 sealing elements 19, which can be designed as O rings. The O rings 19 can be taken up in
23 grooves in the inside walls of the first and second housing part 5, 9.

24 The ring-shaped, plate-like element 11 lies close to the inside wall of the second housing
25 part 9 in the embodiment example shown in Figure 1, with its outside and inside boundaries 11a,
26 11b, wherein the sealing element sufficiently seals off the space between the concave surface of
27 the element 11 and the inside wall of the housing part 9. In this respect, an annular area 13a, 13b

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1 of the sealing element can be constructed on the outside and inside boundary. The inside annular
2 area 13b can be designed so far, in its radial expansion, that it lies close to the inside wall of the
3 housing part 9, at least with a partial area over the entire movement path of the element 11. The
4 space between the concave side of the element 11 and the housing part 9 can also be connected
5 to the surroundings, via one or more (not depicted) canals.

6 If the pressure medium is conducted under a certain pressure to the pressure space 15, via
7 one or more (not depicted) supply canals, then the ring-shaped, plate-like element 11 is bent in
8 the direction of the second housing part 9—that is, the curvature is reduced. In this way, the
9 sections of the element 11, stretching inwards between the slits 14, are moved, with its inside
10 boundary 11b, further inwards in the direction of the object 17, so that a desired braking or
11 clamping force can be exerted on the object by a certain pressure of the pressure medium. The
12 element 11 must, of course, be so dimensioned and be made of such a material that at least in
13 one bending area, there is a sufficient deformability and moreover, the element 11 is constructed
14 sufficiently pressure-resistant as a whole that even with the maximum producible clamping or
15 braking force, which acts on the inside end of the element 11 or is exerted on the object 17 by it,
16 no sharp bending of the element 11 or even a plastic deformation occur.

17 The inside wall of the second housing part 9 is also used as a stop for the ring-shaped,
18 plate-like element 11, so that even with high pressures, an abrupt reverting of the convex
19 curvature to a concave curvature cannot occur. Moreover, the inside wall of the second housing
20 part 9 and/or the ring-shaped, plate-like element 11 or the sealing element 13 can be constructed
21 in such a way that the curvature of the element 11 is reduced, as a maximum, so much that with
22 a subsiding of the pressure, the elastic effect of the element 11 ensure that the element 11 again
23 returns to the curvature present in the pressure-less starting state. In this respect, the inside wall
24 of the housing part 9 can be constructed, for example, slightly convex in the direction of the
25 element 11 or one or more stop elements can be provided on the inside wall of the housing part 9
26 or on the element 11 or on the sealing element 13.

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1 At this point, it should be noted that the sealing element can, of course, also be provided
2 on the outside convex side of the element 11. In this case, it is also possible to use a loose
3 sealing element, not connected to the element 11, for example, a separate, ring-shaped sealing
4 disk made of rubber or plastic.

5 The embodiment of a clamping and/or braking device shown in Figure 3 is similar to the
6 embodiment in Figure 1. Instead of a single ring-shaped, plate-like element 11, five pairs of
7 ring-shaped, plate-like elements 11 [erroneously labeled as 7 in Figure 3a], as a whole, are,
8 however, provided in this embodiment. In this way, ten times the braking or clamping forces can
9 be transferred to the object 17 with the same pressure of the pressure medium.

10 The two ring-shaped, plate-like elements 11 of a pair are placed thereby in such a way
11 that their concave sides oppose each other. In this way, a space sealed-off with respect to the
12 pressure space 15, in which the elements 11 of the pairs of elements, sealed off with respect to
13 each other, is formed, in a simple manner, between each pair of elements 11. With an
14 pressurization of the pressure space 15 with the pressure of the pressure medium, the slit walls of
15 the elements 11 are there to be bent toward one another. Since the inside ends 11b of the
16 elements 11 of a pair move jointly, a sealing off of the space between the elements 11 can be
17 reliably attained with simple means. The outside boundaries of the elements 11 can, of course,
18 also be held, for the fixing, by suitable means in the housing 3, for example, in grooves in the
19 circumferential wall of the cylindrical recess 7 of the first housing part 5. The two elements 11
20 of a pair can, of course, also be connected to one another--for example, they can be locked
21 together.

22 The embodiment of a clamping and/or braking device 1, according to Figure 4, differs
23 from the embodiment shown in Figure 3 merely in that the inside ends 11b of the elements 11 do
24 not apply pressure directly on the object 17 to be braked or to be clamped, but rather, via a
25 ring-shaped pressurizable element 21, which is located inside the housing 3. The pressurizable
26 element 21 is so deformed by the forces exerted by the pairs of ring-shaped, plate-like elements

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1 11--in particular, the inside diameter of the pressurizable element 21 is reduced to such an extent
2 that the forces are transferred, at least partially, to the object 17.

3 This embodiment offers the advantage that the sealing off of the pressure space 15
4 between the housing and the pressurizable element 21 can take place--for example, again via the
5 sealing elements 19 in the form of O rings.

6 As can be seen from Figure 5, in which another embodiment of a clamping and/or
7 braking device is shown, it is also possible to provide a pressurizable element 21, constructed in
8 an integrated manner with the housing 3, instead of a separate pressurizable element. In the case
9 shown, the recess 7 in the first housing part 5 is designed in such a manner that a thin inside wall
10 is formed, which forms the pressurizable element 21. The wall must be so thin that a sufficient
11 deformation can be guaranteed when forces are exerted by the pairs of ring-shaped, plate-like
12 elements 11 and thus a sufficient transfer of these forces to the object 17. The sealing off of the
13 pressure space 15 can take place here in that the thin wall or the pressurizable element 21 is
14 connected to the second housing part 9 in an essentially airtight manner. For the sealing, a
15 sealing element 19, for example, in the form of an O ring, can again be used.

16 Of course, such a clamping and/or braking device can also be designed in such a way that
17 the corresponding forces are transferred to an object on a point-like, linear, or non-ring-shaped
18 closed surface, for example, for the production of a clamping and/or braking device for a linear
19 guide.

20 If one does not interpret the representation in Figure 5 as an excerpt from an essentially
21 rotation-symmetrical representation, but rather as an excerpt from a representation with a (for
22 example, rectangular) housing 3, in which rectangular, plate-like elements 11 are placed, then a
23 clamping and/or braking device is formed for the pressurization of the surface of an object 17, in
24 which, for example, it may be a track of a linear guide. The housing 3 can, for example, be
25 mounted on a carriage, not depicted in more detail, conducted by means of the object 17
26 designed as a track. The carriage can grip the track so that the exertion even of high forces on the
27 surface of the object is possible, without lifting the carriage off the track. The mode of

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1 functioning of, for example, rectangular, plate-like elements can be deduced analogous to the
2 preceding statements in connection with the annular, plate-like elements.

3 If a pressurizable element 21 is not used with such an embodiment, then the plate-like
4 elements 1 can be held, with their inside ends 11a, in the housing or connected firmly with it
5 (one piece or detachable). Of course, a sealing off of the pressure space 15, with respect to the
6 object 17, must then again take place. The lateral edges or areas of the rectangular, plate-like
7 elements must also be sealed off to create a pressure space or a "pressure-less" space between the
8 pairs of plate-like elements.

9 The embodiment according to Figure 6 is also a version of a clamping and/or braking
10 device 1, with which a linear guide can be realized. The first housing part 5 is constructed, in this
11 case, with an H-shaped cross section, wherein between the upper legs of the H, a pair of, for
12 example, rectangular, plate-like elements 11 is provided. Since such elements 11 need not be
13 provided with slits, it is possible, of course, to also dispense with corresponding sealing
14 elements. The pressure space 15 is, in turn, formed outside the pair of the plate-like elements 11.

15 In a pressurization of the pressure space 15, a deformation of the H-shaped housing part 5
16 is produced, in particular, in the area of the middle crosslink of the H and the transition areas
17 between the crosslink and the lateral legs of the H. In this way, the rigidly constructed, lower
18 legs of the H are moved inwards in the direction of the intermediately placed object 17 and
19 transfer corresponding braking or clamping forces to the object. In this respect, it is possible to
20 provide clamping and/or brake shoes 23 on the insides of the lower legs of the H.

21 If instead of an H-shaped housing part 5, a U-shaped housing is used, in which one or
22 more (for example, rectangular) plate-like elements, are provided between the legs of the U, with
23 these elements pressing the legs of the U toward the outside with a pressurization, then an
24 "active loosening" of an object, for example, with a linear guide, can be realized. Of course, this
25 can also be attained with an H-shaped housing in that the brake shoes are located on the outsides
26 of the lower legs of the H and they apply pressure on the object, for example, in a groove.
27 Conversely, an "active clamping or braking" can also be produced with a U-shaped housing, if

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1 the brake shoes are located on the outsides of the legs of the U and correspondingly apply
2 pressure on the object.

3 Finally, it should be pointed out that of course, individual features which are described in
4 the preceding only in connection with a specific embodiment can also be combined, if
5 reasonable, with other embodiments also.
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